The Role of High School Math and Science Course Taking in the Transition to First Birth

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ABSTRACT

This study uses data from the National Longitudinal Study of Adolescent Health and the linked Adolescent Health and Academic Achievement transcript study to assess the relationship between high school math and science course taking and fertility in early adulthood. Using event history analysis, we find that science course taking, but not math, is significantly associated with delayed fertility for women with no post-secondary education. This finding persists net of controls for background characteristics and the timing of high school enrollment and attainment, sex and marriage, and labor market experiences. The findings from this study are suggestive that persistence in the science pipeline delays transition to motherhood apart from increasing educational attainment, and that a purely economic framework for understanding fertility decisions is too limited.

INTRODUCTION

Demographic and economic researchers have long been interested in understanding the link between education and fertility. In general, this research finds a negative association between education and fertility for women. The most common explanation for this finding is based in neoclassical economic theory that postulates that the growing economic independence of women has resulted in delayed motherhood as women with more human capital, including educational and career investments, calculate a greater opportunity cost associated with having children (Becker 1981). However, much of the research on education and fertility is narrowly focused on a single aspect of education—attainment. The credentials earned through educational attainment raise the opportunity costs associated with fertility because they contribute to employment and economic resources. But the gains of education are not limited specifically to returns from market activity because education also includes cognitive, psychological, and social benefits (Hill and King 1995). These aspects of education may also be linked to delayed fertility, but are ignored in a purely economic explanation.

In this study, we explore how math and science course taking influences the transition to first birth for young women. We select these two academic subjects because they are associated with human capital accumulation by influencing future educational and occupational opportunities, especially college enrollment (AAUW 1999). We attempt to disentangle the primarily economic human capital benefits that persistence in the math and science pipeline provide by restricting our analyses to women with no post-secondary educational experiences. Using a sample with lower educational attainment, we explore how individual characteristics and life course events shape how education influences fertility apart from just providing credentials.

BACKGROUND

The transition to first birth is a major event in the life course. Considerable research investigates the link between age at first birth and social, economic, and physical and mental health outcomes (Hofferth and Moore 1979; Moore et al. 1994; Morgan and Rindfuss, 1999; Mirowsky and Ross 2002; Mirowsky 2005). Such research often contradicts the bio-developmental viewpoint, which supports entry into motherhood shortly after puberty, and instead supports a more bio-social viewpoint indicating a later optimal age at first birth. This prolongation of first birth is hypothesized to allow for the accumulation of human and social capital, which in turn may positively impact a variety of outcomes. (Gustafsson 2001; Mirowsky 2002; Mirowsky 2005). Thus, the entry into first birth is critical for influencing long-term outcomes, and there is particular concern that entry into motherhood too young reduces educational and occupational opportunities (Jones et al. 1999).

Broadly, education creates human capital, which may include a variety of skills, abilities, and resources, including improved communication, analytic and problem solving skills, and cognitive flexibility. These skills contribute to the opportunity costs associated with entry into motherhood, and the accumulation of these skills theoretically delays fertility. While some elements of human capital are readily exchangeable for economic resources, other aspects are less directly connected. Human capital resources may also be linked to higher levels of personal control, which gives individuals the feeling that the actions they take will have an effective influence on their lives (Mirowsky and Ross 1998). These resources may also cause individuals to put forth more effort and ability into problems that may arise, and it may improve interpersonal relationships and the ability to negotiate with partners and spouses (Ross and Mirowsky 2002). These aspects of human capital have been hypothesized to influence health outcomes (Seeman and Seeman 1983; Ross and Mirowsky 2002), and are also tied to a sense of self-efficacy about sex and contraceptive use, as well as to fertility (Levinson 1986; Lewis, Ross, and Mirowsky 1999). Personal control may allow women who wish to delay fertility to take the appropriate precautionary steps to avoid pregnancy, including delaying sexual initiation and using contraception. These resources also increase women's ability to weigh the advantages and disadvantages of types of contraception and gives them confidence to act on such decisions in response to opposition (Oddens 1997; Williams 1994; Basu 2002). The psychological resources associated with education may delay fertility, suggesting that the amount or quality of education one receives may impact fertility decisions apart from the pure market exchange value of credentials.

There is considerable variation in the academic experiences of adolescents, which contributes to divergent consequences from education. A large body of literature exists debating the effects of curricular tracking in high school on the educational outcomes of students (Gamoran 1987; Dauber, Alexander and Entwisle 1996; Oakes 1986). This research documents the negative effects of tracking on equality of educational outcomes, indicating that learning environments vary between tracks, with lower tracks getting lower quality teaching and instruction compared to higher tracks. Students who start off with more learning difficulties are placed in tracks that reinforce their learning difficulties and provide limited opportunities to learn (Gamoran and Mare 1989). More rigorous curricular tracks include more complex material, and also have instructors that are more interested and enthusiastic (Gamoran 1987). Furthermore, placement in higher tracks provides opportunities to interact with high status and high ability friends that placement in lower tracks may not provide, resulting in unequal access to important social capital (Eder 1981). Perhaps because of these cognitive and social resources, rigorous course-taking is associated with better health behaviors, such as lower rates of smoking (Picucci, Gonzalez-Lopez, and Schiller 2004).

The American educational system continues to be stratified. Traditionally there were well-defined tracks in high school characterized by a college/non-college dichotomy, but there now exists sequences of learning opportunities (Stevenson, Schiller and Schneider 1994). These sequences are based on a hierarchical organization of topics, which forces mastery of certain concepts and skills before progression to the next course in the sequence. Thus, a student can be in college prep mathematics, while not being in college prep English. In fact, course sequences can provide more precise information about classroom learning experiences than can simple course offerings, and course sequences are better predictors of test scores than are tracks. Sequences may also produce effects independent of achievement, as higher positions in sequences may positively impact overall attitudes towards school engagement (Schneider, Swanson and Riegle-Crumb 1998).

Much emphasis is placed on students' positions within the high school mathematics and science pipelines, as math and science course taking are strong predictors of high school achievement, post-secondary enrollment and later success in the economic stratification system (Schneider et al. 1998; Lee and Frank 1990; AAUW

1999). Unlike other types of subjects, such as humanities courses, math and science courses build upon one another so that a students' position in the sequence at the end of high school provides insight into his/her exposure to complex learning environments and his/her accumulation of certain skills and resources. In addition, students have the option to take higher level math and science courses that may contribute to different opportunities later in the life course. Thus, students' position in math and science sequences may influence the amount of skills, resources, and abilities that are acquired in high school. Going further in both math and science sequences may expose students to more educationally adaptive social contexts and to increasingly complex analytical, cognitive and interpersonal challenges. This exposure therefore contributes to human capital, which increase in turn may influence the transition to motherhood.

This research explores how advancement in the math and science sequences is associated with fertility in early adulthood. We expect that persistence in both math and science pipelines will be associated with delayed transition to motherhood, however this association may only be indirect. Math and science course-taking could influence early fertility through persistence in education, as college enrollment may delay fertility (Blossfeld and Huinink 1991), as well as raise the opportunity costs of fertility accrued from the accumulation of post-secondary credentials. We explore this possibility by limiting our sample to only those women who have not reported enrolling in post-secondary education. We also attempt to account for some important selection processes into math and science courses. There is a large amount of literature suggesting that placement in math and science courses are strongly associated with background characteristics, including race and class (e.g. Jones, Vanfossen, and Engsminger 1995).

Also, math and science course taking may vary as cognitive skill level varies, and a negative association between cognitive skill and early initiation of sex and early pregnancy has been found (Shearer et al. 2002; Neiss, Rowe, and Rogers 2002). Apart from these background characteristics, women who take advanced courses in these subjects may also possess higher levels of psychological resources, including personal control and self-efficacy, and may have a strong desire to accumulate human capital that may expand economic opportunities. Therefore there is a selection effect of women who wish to delay fertility into these more rigorous educational paths.

Educational pathways also structure life-course events. Academic achievement has been shown to impact completion of high school (Schneider et al., 1998; Natriello, Pallas and Alexander 1989), which delays fertility. Education also influences the timing of first sex (Bachu 1999; Halpern et al. 2000) and marriage (Oppenheimer 1988). These events are also strongly associated with fertility. Sexual debut is obviously a necessary condition for fertility, and marriage exerts a strong positive effect on the transition to first birth. It is therefore possible that high school enrollment and graduation, as well as sexual debut and union formation may mediate the association between math and science and fertility. Finally, economic theory posits that women delay fertility due to the opportunity costs associated with motherhood (Becker 1981). Thus, employment history and occupational expectations, independent of credentials, would be expected to impact women's fertility decisions. If persistence in math and science helps women to secure employment, especially in lucrative fields, then employment may mediate the association between math and science and fertility. However, some research indicates that work experience in adolescence may increase the risk of early intercourse and pregnancy (Rich and Kim 2002).

METHODS

Data

We use data from the National Longitudinal Study of Adolescent Health (Add Health) and the linked Adolescent Health and Academic Achievement (AHAA) transcript study to address the relationship between high school math and science course taking and fertility. Add Health includes information on adolescent health and behavior, and is representative of American students in grades 7-12 in 1994-1995. Add Health includes the context that adolescents live in, including peer, family, school, and neighborhood influences. The longitudinal design has a developmental framework that situates these factors as important aspects on a trajectory to adulthood, providing a rich understanding of adolescents and the world they live in (Udry 1998). This research uses the 1995 first wave of in-home surveys (Wave I), the Wave III follow-up in 2001-2002 and the AHAA academic transcript data. At Wave I, adolescents responded on a broad range of questions including family issues, peer networks, future aspirations, and romantic and sexual activity. The same respondents were surveys at the third wave of Add Health in 2001-2002, and at gave their permission to collect transcript data from their 9-12th grade years, which comprises the AHAA data (Muller 2004).

Sample

We use several criteria to select our analytical sample. The number of women in Waves I and III and AHAA is 6434. First, we exclude women from special samples who are missing a sampling weight (n = 324). From this sample, we select only female respondents who were in grades 9-12 at the Wave I interview so we can align the high school transcripts to the Wave I survey year (excluded n = 1827). Then, we exclude women who have not already had a live birth at Wave I so we can model transitions to first birth controlling for prior characteristics (n = 42). Because the focus of the paper is on the effects of math and science for women with lower levels of education, we restrict our sample to respondents who report at Wave III that they have no post-secondary education (excluded n = 2943). Our final analytical sample is 1298. See Table 1 for descriptive statistics for each sample restriction.

Table 1 about here

Measures

Our outcome variable is first birth, with approximately half of the sample reporting at least one live birth by Wave III (see Figure 1 for survival estimates for transition to first birth). The primary independent variables are math and science course taking course sequences, which are hierarchically organized strands of courses in these particular subjects taken through high school (Schneider et al. 1998). These are time varying continuous measures, and reflect the highest level of each subject taken by year. We include control variables for background characteristics including a time varying variable for age, and time invariant controls for race/ethnicity, parent's education, and family structure reported at Wave I. In addition, we control for the score on the Wave I Add Health Picture Vocabulary Test (PVT) which is a version of the Peabody Picture Vocabulary Test and is a proxy for intelligence (Halpern et al. 2000). In addition to the demographic and individual controls, we include controls for personal control, sexual self-efficacy, and college expectations to potentially alleviate some of the selection bias of women into advanced course taking who wish to delay fertility.

Figure 1 about here

We include three areas of life course events as potential mediators: high school education, sex and marriage, and employment. High school education mediators include two time varying dichotomous measures, one for currently attending high school and one reflecting high school graduation. Sex and marriage also are operationalized as time varying dichotomous measures reflecting sexual debut and first marriage. Employment is a three category time varying measure reflecting whether the respondent entered the labor force in the science or technological industry (e.g. engineer, technology support), entered in another industry, or never had a paid job.

Analyses

Because not all respondents have had a first birth by the Wave III interview, we use an event history approach to modeling. To test for proportionality, we included interactions between age and course-taking in preliminary analyses. We found that the effect did not vary, and therefore estimate discrete-time Cox proportional hazard models predicting first birth (Courgeau and Lelievre 1992).

We run five nested models for both math and science course-taking. For each subject, Model 1 includes controls for all demographic and individual variables that are associated with course-taking and fertility. Model 2 includes controls for personal control, self-efficacy, and college expectations as potential selection effects for individuals that are have these resources into more rigorous courses. Models 3 include high school education as a potential mediator, because advanced course-taking may encourage persistence in high school and delayed fertility. Model 4 includes sex and marriage, because persistence in these subjects may delay both sexual initiation and marriage. Finally, model 5 includes entry into the labor market as a potential mediator, and specifically contrasts the effect of being in an industry where math and science skills may be a benefit. Because of the complex sampling design of the Add Health data, we weight all analyses to correct for design effects and unequal probability of selection and to ensure that the results are nationally representative with unbiased estimates (Chantala and Tabor 1999).

RESULTS

Table 1 presents descriptive information on our analytical sample as well as information for each stage of the sampling selection. The final sample comes from a more socioeconomically disadvantaged background, including parents with lower educational attainment, and a lower frequency of two parent families or origin. Compared to the sample that includes women with post-secondary education, the analytical sample is less likely to have graduated from high school and more likely to marry and have a child. This is consistent with research about the association between education and life course transitions. The educational and individual resources are also lower for the analytical sample, including much lower math and science course-taking, lower mean PVT score, and slightly lower mean personal control and self-efficacy. This is consistent with research about the influence of these characteristics on educational attainment. Although the percentage of women who have never worked is slightly higher for the analytic sample, the vast majority held some type of paid employment. Approximately half of the sample has had a live birth by Wave III. Figure 1 displays survival estimates of the transition to first birth, and there is a relatively steady decline in proportion without a birth for women ages 19-25.

Table 2 presents proportional hazard estimates of the association of math course taking and the transition to first birth in early adulthood. We find that math course taking is not associated with the transition to first birth in any models. Although math does not have a significant effect, we do find that several background characteristics and life course events are associated with the transition to first birth. Family structure in particular has a consistent effect across all models. Women with a single parent are particularly likely to have a child. Furthermore, high school enrollment delays fertility, although the acquisition of a high school diploma does not have an effect net of enrollment. This suggests that it is actually leaving school rather than the credential that accelerates fertility. Not surprisingly, sex and marriage are highly predictive of fertility. However, they do not explain the effects of family structure or high school attainment.

<u>Table 2 about here</u>

In contrast, Table 3 presents proportional hazard estimates of the association of science course taking and first birth. In the baseline model, we find that persistence in the science pipeline is negatively associated with fertility net of background characteristics. The addition of personal control, self-efficacy, and college expectations in model 2 does not change the observed association between science and fertility, nor are these variables significantly associated with fertility. In model 3, we again find a strong negative association with fertility, although it does not mediate the association between science and first birth. The same is true for sex and marriage, which are strongly associated with fertility but do not explain the effect of science. The inclusion of employment in Model 5 also does not explain the effect of science, nor does this variable have any significant association with fertility.

Table 3 about here

DISCUSSION

In this study, we investigated the association between math and science course-taking and transition to first birth for young women with no post-secondary education. The economic explanation for delays in fertility is generally that education increases human capital and particularly provides opportunity costs for having children. This explanation is most applicable to studying the role of educational attainment in delaying fertility, because it is the credentials obtained that provide the highest economic returns via employment. In this study, we find that persistence in the science pipeline is associated with delayed fertility for women with no post-secondary education; however we find no significant effect for math. These results are suggestive of a much more complicated relationship than simply opportunity costs, because curriculum influences fertility apart from increasing advanced educational attainment. This suggests that there may be additional explanations for the delay of fertility that is associated with education.

We explored several potential explanations for this association. First, we attempted to correct for some of the inherent endogeneity problems associated with this area of research (Upchurch et al. 2002). In addition to the demographic characteristics that select individuals into certain academic courses and influence fertility, we attempted to identify other underlying characteristics including psychological resources and expectations for educational attainment. Second, we identified other key life course events that potentially may mediate the relationship. We included enrollment and graduation, which are the traditional indicators of education that have been found to influence fertility. We also include sex and marriage as life course events. Sexual debut is an important component because this marks the period where women become at risk for pregnancy. Also importantly, sexual initiation is strongly associated with education and may be a place where women first weight their opportunity costs and make decisions about the risk of fertility. We also address union formation, since decisions about fertility are part of a larger decision about family formation (Upchurch et al. 2002). Finally, we attempted to parcel out the most obvious human capital explanation—employment. We also tried to identify specific industries where persistence in math and science might help secure employment. Surprisingly, none of these variables accounted for the observed association between science and fertility.

The divergent findings between math and science also complicate the simple opportunity costs explanation. To rectify these differences, we can speculate about the potential differences between these two subjects. In terms of content, science courses may contain more specific practical information, specifically about reproduction, than math courses. An additional difference between these two subjects is that school policies generally have different course requirements for math and science. High school students are frequently required to take more math classes (often 4 years) for graduation compared to science (more often 2-3 years). Therefore, students have more choices about persistence in science compared to math. Furthermore, also both domains have hierarchies of course taking, there is more flexibility regarding the structure of science courses, and the ability to take courses is potentially less dependent on initial placement compared to math. Overall, this contributes to greater agency in deciding to take advanced science. Women who elect to take these courses potentially are exposed to students with social norms about life course transitions that likely include delayed fertility to accumulate advanced education and economic resources, and this may translate to individual decisions about the timing of fertility

The consistent negative effect of high school enrollment is consistent with prior research, but we found no independent effect of receiving a high school diploma. An economic framework would suggest that receiving a high school degree would delay fertility because there are greater economic resources for women with a diploma compared to women who did not complete high school (Rosenbaum et al. 1990). However, perhaps there is a countervailing effect that for women with little future educational opportunities, the completion of high school may reflect a transition to adulthood that is more psychologically and economically amenable to motherhood.

There are additional findings from this research that seem inconsistent with prior research. First, we found no effect for the personality characteristics on transition to first birth. One possible explanation is that these measures came from Wave I reports, and potentially changed considerably prior to fertility (although Chubb, Fertman, and Ross 1997 suggest that personal control is rather stable through adolescence). In addition, we found the effects of labor market to be weak and insignificant. Measurement problems may have also masked the effects of employment, since these reflect only the entry into labor, rather than a complete employment history. Furthermore, there is evidence that employers care little about the academic achievement when hiring high school students and graduates (Rosenbaum et al. 1990), so possibly there is no way to exchange additional math and science knowledge for better jobs. Like high school graduation, it is also possible that there is a countervailing effect between delaying fertility because of the opportunity costs associated with better employment, but also the potential that those economic resources provide a foundation for family formation.

These findings from this study are only suggestive, and the interpretation about these findings is limited by several factors. First, the effect of education on fertility is difficult to untangle because of problems of endogeneity. While we have attempted to control for some of this selection, we cannot eliminate the problem. Second, we have used an event history analysis to address the sequencing of life course events, but we have do not have full histories for these events, nor complete longitudinal information about individual characteristics. Future research would benefit by using more complete information, including directly measuring economic resources such as income. Finally, these analyses are confined to young women with low levels of education, and therefore the broader theories about the role of education for fertility may not be applicable. However, the findings from this study do provide a unique and valuable perspective. Using recent longitudinal data that includes rich academic information and detailed personal information, we find that science course taking in particular is an important determinant of fertility apart from the benefit that advanced course taking increases college enrollment. Furthermore, this is not explained by selection of individuals with high aspirations and resources into these classes, nor is it explained by persistence in high school, delayed entry into sex and marriage, or entry into the labor market. Research on education and fertility needs to continue to explore the multiple dimensions of educational experiences to understand how they influence the important transition to motherhood.

REFERENCES

American Association of University Women (AAUW). 1999. *Gender Gaps: Where Schools Still Fail Our Children*. New York: Marlowe and Company.

Bachu, Amara. 1999. "Trends in Premarital Childbearing." Current Population Reports. P23-197. Washington DC: US Department of Commerce.

Basu, Alaka M. 2002. "Why Does Education Lead to Lower Fertility? A Critical Review of Some of the Possibilities." *World Development* 30(10):

Becker, Gary S. 1981. *A Treatise on the Family*. Cambridge: Harvard University Press.

Blossfeld, Hans-Peter and Johannes Huinink. 1991. "Human Capital Investments or Norms of Role Transition? How Women's Schooling and Career Affect the Process of Family Formation." *American Journal of Sociology*, 97: 143-68.

Chantala, K., & J. Tabor (1999). Strategies to perform a design-based analysis using the Add Health data. Retrieved November 29, 2004, from http://www.cpc.unc.edu/projects/addhealth/files/weight1.pdf.

Chubb, N.H., C.I. Fertman, and J.I. Ross. 1997. "Adolescent Self-Esteem and Locus of Control: A Longitudinal Study of Gender and Age Differences." *Adolescence* 23:113-129.

Courgeau, Daniel and Eva Lelievre. 1992. *Event History Analysis in Demography*. Oxford: Clarendon Press.

Dauber, Susan L., Karl L. Alexander, and Doris R. Entwisle. 1996. "Tracking and Transitions through Middle Grades: Channeling Educational Trajectories." *Sociology of Education* 69:290-307.

Eder, Donna. 1981. "Ability Grouping as a Self-Fulfilling Prophecy: A Micro-Analysis of Teacher-Student Interaction." *Sociology of Education*, 54:151-162.

Gamoran, Adam. 1987. "The Stratification of High School Learning Opportunities." *Sociology of Education* 60: 61-77.

Gamoran, Adam and Robert D. Mare. 1989. "Secondary School Tracking and Educational Inequality: Compensation, Reinforcement or Neutrality?" *American Journal of Sociology*, 94:1146-1183.

Gustafsson, S. 2001. "Optimal Age at Motherhood: Theoretical and Empirical Considerations on Postponement of Maternity in Europe." *Journal of Population Economics*, 14(2): 225-247.

Halpern, Carolyn Tucker, Kara Joyner, J. Richard Udry, and Chirayath Suchindran. 2000. "Smart Teens Don't Have Sex (or Kiss Much Either)." *Journal of Adolescent Health,* 26:213-225.

Hill, M. Anne and Elizabeth M. King. 1995. "Women's Education and Economic Well-Being." *Feminist Economics* 1:21-46.

Hofferth, Sandra C. and Kristin A. Moore. 1979. "Early Childbearing and Later Economic Well-Being." *American Sociological Review*, 44(5): 784-815.

Jones, James, Beth E. Vanfossen, and Margaret E. Ensminger. 1995. "Individual and Organizational Predictors of High School Track Placement." *Sociology of Education*, 68: 287-300.

Lee, Valerie and Kenneth A. Frank. 1990. "Students' Characteristics that Facilitate the Transfer from Two-Year to Four-Year Colleges." *Sociology of Education*, 63(3): 178-193.

Levinson, Ruth Andrea. 1986. "Contraceptive Self-Efficacy: A Perspective on Teenage Gils' Contraceptive Behavior." *Journal of Sex Research* 22:347-369.

Lewis, Susan K., Catherine E. Ross, and John Mirowsky. 1999. "Establishing a Sense of Personal Control in the Transition to Adulthood." *Social Forces* 77: 1573-1599.

Mirowsky, John. 2002. "Parenthood and Health: The Pivotal and Optimal Age at First Birth." *Social Forces* 81(1): 315-349.

Mirwosky, John. 2005. "Age at First Birth, Health, and Mortality." *Journal of Health and Social Behavior* (conditional accept, tentatively scheduled for March 2005).

Mirowsky, John and Catherine E. Ross. 1998. Education, personal control, lifestyle and health. *Research on Aging* 21(4):415-450.

Mirowsky, John and Catherine Ross. 2002. "Depression, Parenthood, and Age at First Birth." *Social Science and Medicine* 54: 1281-1298.

Moore, Kristen A., David E. Myers, Donna Ruane Morrison, Christine Winquist Nord, Brett Brown, and Barry Edmonston. 1994. "Age at First Birth and Later Poverty." *Journal of Research on Adolescence* 3:393-422.

Morgan, S.E. and R.R. Rindfuss. 1999. "Reexamining the Link of Early Childbearing to Marriage and Subsequent Fertility." *Demography* 36:59-75.

Muller, Chandra. 2004. "Adolescent Health and Academic Achievement." Retrieved September 22, 2004. (www.prc.utexas.edu/AHAA)

Natriello, Gary, Aaron M. Pallas, and Karl Alexander. 1989. "On the Right Track? Curriculum and Academic Achievement." *Sociology of Education*, 62:109-118.

Neiss, Michelle, David C. Rowe, and Joseph L. Rodgers. 2002. "Does Education Mediate the Relationship Between IQ and Age at First Birth? A Behavioral Genetic Analysis." *Journal of Biosocial Science* 34: 259-275.

Oakes, Jeannie. 1985. *Keeping Track: How Schools Structure Inequality*. New Haven, CT: Yale University Press.

Oddens, B.J. 1997. "Determinants of Contraceptive Use Among Women of Reproductive Age in Great Britain and Germany: Psychological Factors." *Journal of Biosocial Science* 24:437-470.

Oppenheimer, Valerie K. 1988. "A Theory of Marriage Timing." *American Journal of Sociology* 94: 563-591.

Picucci, Ali Callicoatte, Lorena Gonzalez-Lopez, and Kathryn Schiller. 2004. "Problem Solving Skills, Curriculum Exposure, and Adolescent Smoking." Paper presented at the annual meetings of the American Sociological Association. San Francisco, CA: August 14-17, 2004.

Rich, Lauren M. and Sun-Bin Kim. 2002. "Employment and the Sexual and Reproductive Behavior of Female Adolescents." *Perspectives on Sexual and Reproductive Health* 34(3): 127-134.

Rosenbaum, James E., Takehiko Kariya, Rick Settersten, and Tony Maier. 1990. "Market and Network Theories of the Transition from High School to Work." *Annual Review of Sociology* 16: 263-299.

Schneider, Barbara, Christopher B. Swanson, and Catherine Riegle-Crumb. 1998. "Opportunities for Learning: Course Sequences and Positional Advantages." *Social Psychology of Education*, 2:25-53.

Seeman, Melvin and Teresa E. Seeman. 1983. Health Behavior and Personal Autonomy: A Longitudinal Study of the Sense of Control in Illness. *Journal of Health and Social Behavior* 24(2): 144-160.

Shearer, Darlene L., Beverly A. Mulvihill, Lorraine V. Klerman, Jan L. Wallander, Mary E. Hovinga, and David T. Redden. 2002. "Association of Early Childbearing and Low Cognitive Ability." *Perspectives on Sexual and Reproductive Health* 34(5): 236-243.

Stevenson, David Lee, Kathryn S. Schiller, and Barbara Schneider. 1994. "Sequences of Opportunities for Learning." *Sociology of Education*, 67(3): 184-198.

Udry, J. Richard. 1998. The National Longitudinal Study of Adolescent Health (Add Health), Waves I&II, 1994-1996 [machine-readable data file and documentation]. Chapel Hill, NC: Carolina Population Center, University of North Carolina at Chapel Hill (Producer).

Upchurch, Dawn, Lee Lillard, and Constantjin Panis. 2002. "Nonmarital Childbearing: Influences of Education, Marriage, and Fertility." *Demography* 39(2): 311-329.

Williams, Lindy B. 1994. "Determinants of Couple Agreement in U.S. Fertility Decisions." *Family Planning Perspectives*, 26(4): 69-173.

Figure 1: Survival Estimate for Transition to First Birth

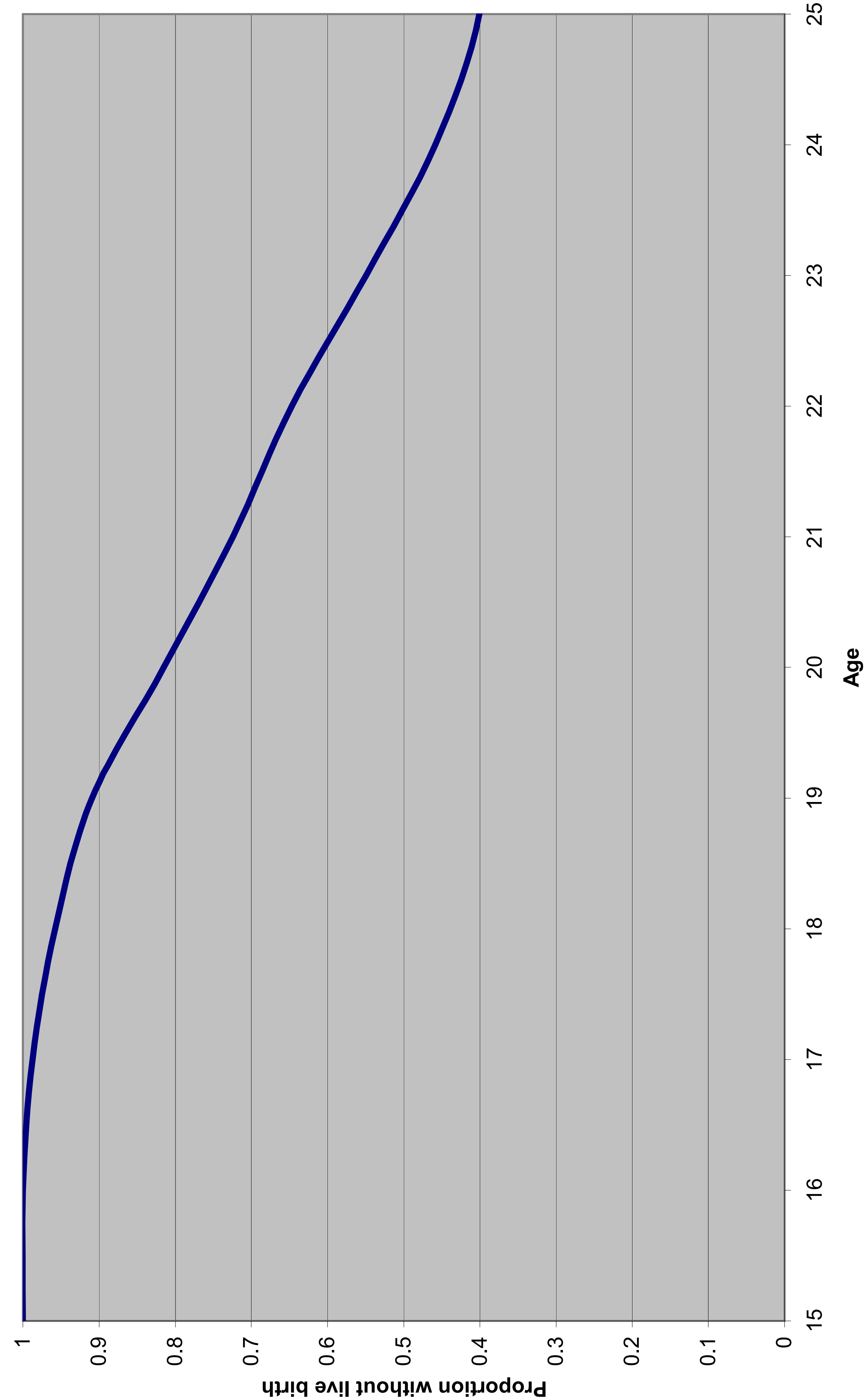

Table 1: Descriptive Statistics by Sample Selection Process

	All Females*	Filter 1	Filter 1 & 2	Filter 1, 2, & 3	Analytic Sample
Frequencies					
Race/Ethnicity					
Non-Latina White [ref]	56	70	69	69	64
Non-Latina Black	21	15	15	15	19
Mexican-Origin	8	6	6	6	9
Other	15	9	9	9	8
Parental Education					
More than high school [ref]	61	59	61	61	41
High school	28	30	28	28	40
Less than high school	11	10	11	11	20
Family Structure					
Two-parent [ref]	54	57	58	58	43
Step family	18	17	16	16	22
Single parent family	23	21	21	21	26
Other family structure	6	5	5	5	9
Entered labor force					
Never worked [ref]	18	13	11	11	14
Entered with non-science/tech job	78	83	85	85	82
Entered with science/tech job	4	4	4	4	4
Graduated high school	88	87	90	90	77
Had sex	87	87	90	90	94
Married	20	20	25	25	35
Had live birth	24	24	28	27	49
Means (standard deviations)					
Highest math sequence	6.26	6.34	6.34	6.36	5.02
range=0-9	(1.87)	(1.83)	(1.82)	(1.82)	(1.67)
Highest science sequence	4.42	4.40	4.41	4.41	3.65
range=0-6	(1.23)	(1.20)	(1.20)	(1.20)	(1.16)
Age Wave III	21.87	21.73	22.70	22.70	22.75
range=18-27	(1.75)	(1.88)	(1.26)	(1.26)	(1.27)
PVT	100.48	101.67	102.76	102.75	96.62
range=16-146	(13.91)	(14.05)	(13.11)	(13.12)	(12.87)
Personal control	3.89	3.87	3.90	3.90	3.78
range=1-5	(.89)	(.91)	(.87)	(.87)	(.94)
Self-efficacy	4.61	4.65	4.49	4.49	4.36
range=1-5	(.89)	(.89)	(.98)	(.97)	(1.14)
College expectations	4.34	4.33	4.34	4.35	3.65
range=1-5	(1.04)	(1.09)	(1.05)	(1.05)	(1.31)
Unweighted N	6434	6110	4283	4241	1298

Filters: 1=valid sample weight, 2=Valid Wave 1 high school transcript, 3=Wave 1 no live birth, Analytic Sample=no post-secondary education

* Descriptive statistics for initial sample are unweighted, all others are weighted

Table 2: Estimates of the Impact of Math Course Taking on First Birth

	Model 1		Model 2		Model 3		Model 4		Model 5	
Highest level of math	1.00		1.01		1.02		1.01		1.01	
Demographic and Individual Controls										
Race/Ethnicity										
Non-Latina White [ref]	1.00		1.00		1.00		1.00		1.00	
Non-Latina Black	0.92		0.93		0.93		1.11		1.11	
Mexican-Origin	0.75		0.75		0.75		1.07		1.08	
Other	0.81		0.81		0.78		0.84		0.83	
Parental Education										
More than high school [ref]	1.00		1.00		1.00		1.00		1.00	
High school	1.02		1.01		1.01		1.06		1.06	
Less than high school	1.12		1.11		1.10		1.09		1.08	
Family Structure										
Two-parent [ref]	1.00		1.00		1.00		1.00		1.00	
Step family	1.37	*	1.35		1.34		1.27		1.27	
Single parent family	1.81	**	1.83	**	1.88	**	1.86	**	1.87	**
Other family structure	1.42		1.38		1.41		1.28		1.27	
Age										
16 and under [ref]	1.00		1.00		1.00		1.00		1.00	
17	1.40		1.38		1.29		0.97		0.98	
18	2.41	**	2.39	**	1.86	*	1.25		1.27	
19	3.05	**	3.02	**	1.65		1.07		1.08	
20	2.28	**	2.25	**	1.09		0.66		0.67	
21	3.42	**	3.39	**	1.61		0.94		0.95	
22	3.20	**	3.19	**	1.51		0.86		0.87	
23 and older	2.04	*	2.04	*	0.96		0.50		0.51	
PVT	1.01		1.01		1.01		1.00		1.00	
Personal Characteristics										
Personal control			0.97		0.98		1.00		1.00	
Self-efficacy			0.93		0.93		0.93		0.93	
College expectations			0.98		0.99		0.98		0.98	
Life Course Events										
<u>High School Education</u>										
Enrolled in high school					0.45	**	0.51	**	0.51	**
Graduated					0.92		0.93		0.93	
<u>Sex and Marriage</u>										
Had sex							9.05	**	0.91	**
Married							2.84	**	2.81	**
<u>Employment</u>										
Entered labor force										
Never worked [ref]									1.00	
Entered with non-science/tech job									0.93	
Entered with science/tech job									1.34	

* p<.05, ** p<.01

Table 3: Estimates of the Impact of Science Course Taking on First Birth

	Model 1		Model 2		Model 3		Model 4		Model 5	
Highest level of science	0.89	*	0.89	*	0.90	*	0.86	*	0.86	*
Demographic and Individual Controls										
Race/Ethnicity										
Non-Latina White [ref]	1.00		1.00		1.00		1.00		1.00	
Non-Latina Black	0.95		0.95		0.95		1.15		1.15	
Mexican-Origin	0.76		0.76		0.76		1.08		1.09	
Other	0.83		0.83		0.80		0.85		0.85	
Parental Education										
More than high school [ref]	1.00		1.00		1.00		1.00		1.00	
High school	1.00		0.99		0.98		1.03		1.04	
Less than high school	1.08		1.07		1.07		1.05		1.04	
Family Structure										
Two-parent [ref]	1.00		1.00		1.00		1.00		1.00	
Step family	1.37	*	1.35		1.35		1.27		1.28	
Single parent family	1.79	**	1.80	**	1.86	**	1.86	**	1.86	**
Other family structure	1.40		1.37		1.40		1.28		1.27	
Age										
16 and under [ref]	1.00		1.00		1.00		1.00		1.00	
17	1.50		1.49		1.38		1.04		1.05	
18	2.64	**	2.64	**	2.00	*	1.34		1.35	
19	3.35	**	3.36	**	1.77		1.14		1.15	
20	2.51	**	2.51	**	1.17		0.71		0.71	
21	3.77	**	3.78	**	1.73		1.00		1.01	
22	3.56	**	3.58	**	1.63		0.93		0.94	
23 and older	2.27	*	2.29	*	1.04		0.54		0.55	
PVT	1.01		1.01		1.01		1.00		1.01	
Personal Characteristics										
Personal control			0.97		0.97		1.01		1.00	
Self-efficacy			0.93		0.93		0.93		0.94	
College expectations			1.00		1.01		1.00		1.05	
Life Course Events										
High School Education										
Enrolled in high school					0.46	**	0.52	**	0.52	**
Graduated					0.99		1.02		1.02	
Sex and Marriage										
Had sex							9.32	**	9.34	**
Married							2.87	**	2.84	**
Employment										
Entered labor force										
Never worked [ref]									1.00	
Entered with non-science/tech job									0.93	
Entered with science/tech job									1.40	

* p<.05, ** p<.01